Turning Up the Heat on Malignant Hyperthermia

Katie Carroll

Otterbein University, katie.carroll@otterbein.edu

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Malignant hyperthermia (MH) is a genetic, autosomal dominant, neuromuscular disorder that is caused by mutations in the Ryanodine Receptor (RYR1) gene. These mutations lead to an excessive release of calcium from the sarcoplasmic reticulum, which stimulates actin and myosin to bind, leading to muscle contraction and cell death.

Pathophysiological Processes

Malignant hyperthermia will aid the regards to the pathophysiology of increase risk of death (Redmond, 2001). Yet, delayed action will quickly crucial and can adequately impede the (Donnelly, 1994). Prompt intervention is male and female, child and adult however, revolves around the facts that by 1980 (Saleh, 1992). The concern, although considered a rare event, the mortality rate of an malignant hyperthermia was eighty percent in 1960 and has steadily declined to less than ten percent by 1980 (Saleh, 1992). The concern, however, revolves around the facts that malignant hyperthermia is a hereditary condition that is difficult to screen for prior to the administration of anesthesia, and it occurs in every country and race, male and female child and adult (Donnelly, 1998). Prompt intervention is crucial and can adequately impede the progression of this life-threatening metabolic state, yet delayed action will quickly cause death (Redmond, 1991). Therefore, continued education in recognizing the signs and symptoms of malignant hyperthermia will still the surgical team in identifying risk factors, recognizing and warning, and intervening appropriately to protect patients from a potentially life-threatening reaction.

Case Study

A 22 year old male presented to the military hospital after being injured by an improvised explosive device. He presented with a penetrating wound to his left thigh; radiological findings confirmed a left linear fracture. The patient was conscious and able to answer questions; he denied any allergy or past medical history. The man was prepared for surgery and given ketamine; 50 mg; atropine, 30 mg; and succinylcholine 120mg for rapid sequence intubation. The preinduction vitals are as follows: blood pressure (BP) 115/60 mmHg; heart rate (HR) 118/42; temperature 98.6 degrees F. General anesthesia was maintained with sevoflurane, 15% and oxygen. Two minutes after intubation, the patient’s temperature was 100.9F. The anesthesiologist gave nebulized sevoflurane and ordered a cooling blanket. The anesthesiologist noted that the patient was not sweating, which was a significant sign of MH. The patient was then given dantrolene, 2.5mg/kg. Once the anesthesia machine was inspected but no malfunction was noted. The temperature climbed to 100.9F, therefore another cooled the patient with ice, however, temperature 98.6 degrees F. General anesthesia was maintained with sevoflurane, 15% and oxygen. Two minutes after intubation, the patient’s temperature was 100.9F. All of the preinduction vitals were steady. Seventy minutes after intubation, the patient was completely stable and was transported to another facility (Banet, Weatherman, Spence, Powell, Moulden & Capsonace, 2015).

Conclusion

Malignant hyperthermia is a rare and fatal disorder that can be challenging to detect and treat. Due to the low incidence of MH events, medical personnel are often not familiar and/or confident in the management of such an event. Therefore, it is the responsibility of the healthcare team to familiarize themselves with the clinical presentation and signs of MH, expected treatments, and evaluation of successful intervention. A study was done in the Midwest with all surgeons and personnel being placed in various clinical simulations that were set to resemble a malignant hyperthermia crisis. The study found that the medical team was educated on the disorder, simulation was completed, and all members were debriefed. The findings produced protocols and exercises that are done on a monthly basis to ensure that all members of the OR team are prepared for MH if it should arise. One recommendation that was the teams assigning each person with a specific task in order to accomplish all the interventions needed to safely care for a MH patient. For example, multiple members needed to dilantin as dantrolene to diltiazem to be a tedious step, another cooled the patient with ice, another documented the event, etc. (Cain, Reiss, Gettrust, & Novlaja, 2014).

References